1.   A method of obtaining debug information, comprising:

executing a sequence of instructions by a device under test (DUT);

executing the sequence of instructions by an emulator device emulating the functions of the DUT and executing the sequence of instructions in lock-step fashion with the DUT;

the DUT conveying I/O read information to the emulator device; and

a host computer system reading real-time state and debug information from the emulator device without interrupting the DUT.

2.   The method according to claim 1, wherein the DUT and the emulator device operate in a cycle comprising a data transfer phase and a control phase.

3.   The method according to claim 2, wherein the I/O read information is conveyed to the emulator device during the data transfer phase.

4.   The method according to claim 3, wherein the I/O read information is conveyed to the emulator device after a start of instruction transition occurs and prior to execution of an instruction.

5.   The method according to claim 4, wherein the I/O read information comprises eight bits of information, and wherein the I/O read information is conveyed to the emulator device over two data lines carrying four serial bits each over a time period defined by four system clock cycles.

6.   The method according to claim 1, further comprising conveying interrupt vectors from the DUT to the emulator device during an interrupt service cycle.

7.   The method according to claim 6, wherein the interrupt service cycle begins after assertion of an interrupt data line.

1   8.   The method according to claim 1, wherein the DUT is selected from one of

2   a microcontroller, a microprocessor, a microcomputer and an electronic circuit

3   device incorporating an internal processor.

1   9.   A method of obtaining debug information, comprising:

2   a)   executing a sequence of instructions by a microcontroller device;

3   b)   in synchronization with a), an emulator device emulating the functions of the

4   microcontroller and executing the sequence of instructions in lock-step fashion with

5   the microcontroller;

6   c)   the microcontroller conveying I/O read information to the emulator device;

7   and

8   d)   a host computer system reading real-time state and debug information from

9   the emulator without interrupting the microcontroller.

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11 10.   The method according to claim 9, wherein the microcontroller and the

12 emulator device operate in a cycle comprising a data transfer phase and a control

13 phase.

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15 11.   The method according to claim 10, wherein the I/O read information is

16 conveyed to the emulator device during the data transfer phase.

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18 12.   The method according to claim 11, wherein the I/O read information is

19 conveyed to the emulator device after a start of instruction transition occurs and

20 prior to execution of an instruction.

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22 13.   The method according to claim 12, wherein the I/O read information

23 comprises eight bits of information, and wherein the I/O read information is

24 conveyed to the emulator device over two data lines carrying four serial bits each

25 over a time period defined by four system clock cycles.

26

27 14.   The method according to claim 9, further comprising conveying interrupt

28 vectors from the microcontroller to the emulator device during an interrupt service

29 cycle.

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1   15.   The method according to claim 14, wherein the interrupt service cycle begins
2   after assertion of an interrupt data line.
3
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16.   A method of obtaining debug information, comprising:

executing a sequence of instructions by a device under test (DUT);

executing the sequence of instructions by an emulator device emulating the functions of the DUT and executing the sequence of instructions in lock-step fashion with the DUT;

the DUT conveying I/O read information to the emulator device;

a host computer system reading real-time state and debug information from the emulator device without interrupting the DUT;

the DUT and the emulator device operating in a cycle comprising a data transfer phase and a control phase, wherein the I/O read information is conveyed to the emulator device during the data transfer phase after a start of instruction transition occurs and prior to execution of an instruction;

wherein the I/O read information comprises eight bits of information, and wherein the I/O read information is conveyed to the emulator device over two data lines carrying four serial bits each over a time period defined by four system clock cycles; and

conveying interrupt vectors from the DUT to the emulator device during an interrupt service cycle, with the interrupt service cycle beginning after assertion of an interrupt data line.

17.   The method according to claim 16, wherein the DUT is selected from one of a microcontroller, a microprocessor, a microcomputer and an electronic circuit device incorporating an internal processor.